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Abstract

Research has shown that juvenile delinquents exhibit a high prevalence of visual dysfunction. There is also a strong literature base on the social behavior problems in this same population. The aim of this thesis is to examine the hypothesis that there is an association between disruptive classroom behavior in middle school age "at risk" students and visual dysfunction. 70 socially "at risk" juveniles were screened with a visual battery consisting of: refractive status, eye movement skills, near-far focusing ability, form discrimination, and eye health. The Child Behavior Checklist was utilized to establish child behavior profiles. Relative risk factors were evident with refractive disorders, binocular dysfunction, eye motility, and form discrimination. However, the associations did not yield statistically significant correlations between certain problematic behaviors and visual difficulties.

Degree Type

Thesis

Degree Name

Master of Science in Vision Science

Committee Chair

Willard Bleything

Subject Categories

Optometry

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The Link between Juvenile Delinquency and Visual Problems

PRESENTED BY:

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In partial fulfillment for the Master of Education
Visual Function of Learning
at Pacific University

May 19, 2001

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ACKNOWLEDGEMENTS

Many thanks to my faculty advisors on this project: Dr. Wid Bleything and Dr. Anita McClain. Dr. Bleything, thank you for all your time, energy, and resources. Dr. McClain, thank you for your constructive ideas. Thank you both for your support and patience.

I would also like to thank Kristin Liffick (Optometry Class of 2001), my partner for this project. Your dedication provided the energy to make this project work!

ABSTRACT

Research has shown that juvenile delinquents exhibit a high prevalence of visual dysfunction. There is also a strong literature base on the social behavior problems in this same population. The aim of this thesis is to examine the hypothesis that there is an association between disruptive classroom behavior in middle school age "at risk" students and visual dysfunction. 70 socially "at risk" juveniles were screened with a visual battery consisting of : refractive status, eye movement skills, near-far focusing ability, form discrimination, and eye health. The Child Behavior Checklist was utilized to establish child behavior profiles. Relative risk factors were evident with refractive disorders, binocular dysfunction, eye motility, and form discrimination. However, the associations did not yield statistically significant correlations between certain problematic behaviors and visual difficulties.

Introduction

Conduct disorders have been a concern for those in education for many years. Disruptive children in the classroom lose the full benefits of the educational process, pose a distraction for other children, and lessen the effectiveness of the teacher's efforts. What seems a simple 'disruptive classroom behavior' problem in the early grades can sometimes lead to a major concern as the child progresses through the school system. For example, research studies have established that disruptive behavior as early as the first grade is a reliable predictor of juvenile delinquency when children enter their teens.¹ There is also substantial data showing the association between learning disabilities and juvenile delinquency.²⁻¹³ These studies indicate that 80-90% of the juvenile delinquent population is learning disabled and are often behind in reading by 4-5 grade levels. So, research has shown a strong association that disruptive behavior in the first grade puts a child at particular risk for anti-social behavior as a teen-ager, and that juvenile delinquents are prone to be learning disabled.

Research has also established that the juvenile delinquent population exhibits a high prevalence of health problems, specifically visual dysfunctions.¹⁴⁻²⁵ Most recent studies indicate the prevalence of vision disorders in the juvenile delinquent population to be as high as 62%.²⁶ Problems are particularly evident in eye movement and near focusing skills, as well as two-eyed coordination. A 1999 study by Borsting, Rouse and DeLand¹⁶ related high Connor's Parent Rating Scales to students with convergence insufficiency. All of these visual skills are essential for meeting the demands of the classroom. In other words, when visual dysfunctions are present, the child is not fully equipped to benefit from classroom instruction.

There is a strong literature base to indicate the relationship between visual dysfunction and learning disabilities.²⁷⁻³³ Problems particularly evident in the learning disabled population are poor eye movement skills, near focusing problems and difficulty with two-eyed coordination. It is, therefore, no coincidence that the visual profile of the learning disabled (LD) child matches that of the juvenile delinquent. However, caution is

appropriate in developing this argument. Clearly, not all LD children turn out to be juvenile delinquents. What we can say is that LD children have a greater risk factor of becoming juvenile delinquents due to their visual profile.

The public has placed high expectations upon the education system. What began years ago as the basics in reading, writing and arithmetic has progressed to the goal of producing a model citizen capable of surviving in a world of increasing complexity. This being true, effectiveness in the educational process must be continually sought. Advances in technology have been of great help however the most important resource remains the classroom teacher. Children who display conduct disorders do not learn to their potential, distract those around them and draw the teacher -this important resource- from productive educational activities, thus lowering the effectivity of the entire educational process.

If, indeed, it is determined there to be an association between disruptive behavior and visual dysfunction, a process can be considered for early identification of these children. Early identification will ultimately serve to maximize the learning opportunities for these children and consequently remove a potential risk factor for more serious anti-social behavior.

In summary, research has shown three clear associations: vision disorders and juvenile delinquency, vision disorders and learning disabilities, and learning disorders and juvenile delinquency. The question this research attempts to answer is, "Do children with disruptive behavior in early grades have a higher than normal prevalence of visual dysfunction?" The theoretical model is that children who must depend upon a poorly functioning visual system have difficulty meeting the demands of the classroom and 'act out' their frustration in the form of disruptive behavior. The aim of this study, then, is to examine the hypothesis that there is an association between disruptive classroom behavior in middle school-aged "at risk" students and visual dysfunction.

The Child Behavior Checklist, an extensive behavioral assessment battery, is frequently used by educators to assess school-aged children. This battery was utilized to gauge the specific behavioral traits of our subject pool. Our hypothesis is that children identified as having behavioral problems by the Child Behavior Checklist will also score poorly on a battery of visual tests.

Method and procedures:

Our study was performed on juveniles from Oregon during a 3 month period between March and May 2000. Three sites were chosen: one rural, one in suburbia, and one in a treatment facility for boys with behavior problems. Three main examiners conducted the study with the help of 15 second and third-year optometry students from Pacific University College of Optometry. All visual testing was done on-site at the schools in conference rooms or classrooms. Equipment and forms were furnished by Pacific University College of Optometry. The subjects were screened for refractive, binocular vision, perception, motility, and ocular disease disorders utilizing a detailed, specific list of pass/fail criteria. The following tests were performed:

-Sharpness of vision far and near (visual acuity)

A standard Snellen lighted acuity box was used to measure distance acuity. The acuity box stand was placed 20 feet from the subject, while the subject sat in a chair as he/she called off the letters. The near acuity was measured with the reduced Snellen acuity chart, at a measured distance of 40 cm, with a near lamp illuminating the chart.

-Refractive Status (Static retinoscopy)

Free space static retinoscopy was performed in a darkened room, with the participant sitting in a chair, looking at the Snellen acuity light box at 20 feet, wearing glasses that compensated for the working distance of the scoper. Free lenses from a standardized lens kit was used to neutralize the reflex. Each examiner had at least two years of experience.

-Eye movements (ocular motility)

Range of motion was tested with a standard 1mm colored bead attached to a 6 in. clear wand. Each subject was asked to follow the bead, which was moved in front of him/her at a standard speed. Subjective evaluations were made by the examiner in reference to the amount of supportive head movement and the accuracy to which the movements were done. Motility was also assessed with the Developmental Eye Movement (DEM) Test.

-DEM

Subjects were tested at a well lit table on an individual basis. Each individual was told to read the vertical and horizontal columns as quickly as possible without making mistakes. Test times were recorded using hand held stopwatches. All tests were scored according to the DEM instruction booklet by one of the principal investigators.

-Two-eyed coordination (cover test, near point of convergence, stereo acuity)

Cover test was performed at both distance (20 ft.) and near (40 cm.). The cover-uncover was done first, followed by the alternate cover test, and finishing with the cover-uncover test. The subject either looked at a letter on the Snellen acuity box standing 20 feet away, or at a bead 40 cm away.

Near point of convergence was tested using the same standard 1 in. bead. The bead was placed at eye level directly in front of the subject, starting at 50 cm. It was slowly moved in closer to the subject until the subject reported seeing the bead double, or the examiner saw a breakdown of binocularity.

Stereo acuity was tested using the Wirt circles and the Stereo butterfly. The subject wore Polaroid glasses while observing the Randot tests at 40cm, with standard illumination.

-Near-far focusing ability (accommodative facility)

Accommodative facility was measured with + 2.00/-2.00 flippers. The subject was asked to clear the 6M paragraph of the Donder's nearpoint card, which was held at 40 cm with standard near illumination, with the (+) side of the flipper held before the

student first. Test times to clear 6 cycles (+ and – is one cycle) were measured by hand held stopwatches.

-Discrimination of form (Beery VMI)

The Beery Visual Motor Integration (VMI) Test investigates the important areas of visual discrimination, figure-ground discrimination, visual completion, and visual memory with a motor response from the patient. There were 23 forms, increasing in difficulty, ranging from a simple diagonal line to a complex 3-D form. The subject was given a piece of unlined white paper and pencil, and asked to copy the form “exactly as it appears” onto their paper. They were told no erasing was permitted, and there was no time limit. Note: due to the subjectivity of scoring, this test was analyzed by one examiner in order to keep the inter-examiner reliability high.

-Eye health (direct ophthalmoscopy/external exam)

Ocular health was performed in a completely dark room using the direct ophthalmoscope. It was done as a screening to rule out any gross ocular disease. Only deviations from the norm were recorded. All other outcomes were recorded as “within normal limits”.

All tests were non-invasive and ones commonly done in the course of a standard visual examination. The visual testing battery took approximately 30 minutes to administer on each subject. Scheduling was done in an overlap fashion at 15 minute intervals such that a maximum of two children were out of the classroom at any one time. Testing duration depended on the number of children at each individual school. (* The testing sequence was designed to minimize the need for children to be out of the classroom for any extended time)

The Child Behavior Checklist (CBCL), originally published by Achenbach and Edelbrock (1983), was utilized to establish child behavior profiles. This test consists of 113 questions describing various behaviors that fit into distinct behavioral profiles via a standardized test format. The CBCL was completed by the student’s classroom teacher

(or teaching aide) from typical observations that took place in the course of normal school activity. This test comes highly recommended from those in developmental psychology and has reliable test-retest and internal consistency characteristics.

All data collected were treated in confidence. The only exception to this was in the summary report made available to each parent relative to the results of the vision testing.

Data were recorded on standard forms provided by Pacific University and entered into a data base utilizing Filemaker software. Results from the two batteries of tests was examined for any associated traits. Data was exported into Excel software for analysis and charting. The results of the study will be summarized in a final report and made available to appropriate individuals within the corresponding school districts. If it is deemed useful by the District, an in-service session will be scheduled at project completion thus sharing the results in a collective fashion and discussing pertinent questions.

Subjects

Our study sample consisted of seventy “at-risk” juveniles between the age of 11 to 17 years, with a mean age of 15 years. There were 12 subjects from an alternative classroom in the public school system in Vernonia, Oregon. Among the 12, some of the students were self-enrolled into the alternative/vocational program, while others were placed due to lack of academic achievement and/or lack of ability to relate to their peers. Nine subjects were from an alternative program in the public school system in Beaverton, Oregon. These students were placed into the alternative classroom by administrators due to their lack of academic achievement in the regular system. Forty-nine subjects were from an all-boys training facility in Beaverton, Oregon. These boys are mainly wards of the court, and placed into the training facility in a last strike attempt to rehabilitate them. All the children have serious emotional and behavioral problems. Only those participants that signed a release form were included in the study. The sample population consisted of 11 percent female and 89 percent male.

Results

In our experimental design, the “fail” criteria that was designated for each of the tests were as follows:

Visual acuity distance and near: 20/40 or worse monocular or binocular

Refractive status: +1.25 of hyperopia or more; -0.50 of myopia or more; -0.75 of astigmatism or more, monocular and binocular

Cover test: any tropia

NPC: 3/5 inches (6/10 cm) or greater

Stereo acuity: 80 seconds of arc or worse

Accommodative facility: 8 sec/cycle or more

Motility (DEM): 25 percentile below age appropriate normative value

Visual Motor Perception (Beery): 1.5 years below age appropriate normative value

Direct ophthalmoscope: any evidence of ocular disease

Behavioral profiles were assessed by the classroom teacher utilizing the Child Behavior Check List (Achenbach). The teacher assessed each child after a minimum of two months of observation, with a 113-question check list. Failure was any “clinical” score as set by the test norms.

All 70 subjects failed some area of visual function. Scores range from 0% in ocular disease to 70% in visual-motor perception to 71% in refractive problems. All subjects displayed some sort of clinically significant behavior problem ranging from 4% in somatic complaints to 27% in anxious/depressed.

Comparisons were made as to the visual conditions found with the various behavior problems. This is termed co-morbidity. Co-existing conditions with “fail” scores that were 20% congruent or greater for boys were:

Refractive status: withdrawn, anxious/depressed

Visual motor perception: anxious/depressed

Co-existing conditions with “fail” scores that were 20% congruent or greater for girls were:

Refractive status: delinquent behavior

Accommodative facility: thought problems, attention problems, delinquent behavior

VMP: delinquent behavior

The odds ratio was computed to determine the relative risk of having a particular behavior profile in the presence of a specific visual dysfunction. Only those factors where the risk was at least two times greater were considered.

$$\text{Odds Ratio} = \frac{\frac{\text{Cases (exposed)}}{\text{Cases (non-exposed)}}}{\frac{\text{controls (non-exposed)}}{\text{controls (exposed)}}} \times$$

Relative risk factors of two times or greater for “withdrawn” profile were:

Refractive status 7.5x

Binocular 2.28x

VMP 4.5x

Relative risk factors of two times greater for “anxious/depressed” profile were:

Binocular 2.13x

VMP 2.83x

Relative risk factors of two times or greater for “social problems” profile were:

VMP 5.05x

Relative risk factors of two times for “thought problems” profile were:

Binocular 2.31x

Relative risk factors of two times for “attention problems” profile were:

Motility (DEM) 2.5x

VMP 2.6x

Relative risk factors of two times or greater for “delinquent behavior” profile were:

Motility (DEM) 2.14x

VMP 4.6x

Relative risk factors of two times or greater for “aggressive behavior” profile were:

Refractive status 2.6x

Binocular 2.39x

Discussion

The purpose of this research project was to investigate a proactive approach to identifying those in the school system with undiagnosed visual problems and compare these results to their behavior profiles. There has been a great deal of research done on the link between delinquency and visual dysfunction. David Dzik explored the link between reading ability and juvenile delinquency in the Tennessee court system in 1966¹⁹. Roger Dowis found a significant correlation between learning problems and juvenile delinquency in Boulder, Colorado in 1973. ¹⁸ A congressional Report on this topic was presented by the Comptroller General of the United States in 1977.⁴ More recent studies include Stanley Kaseno’s look at visual perception and juvenile delinquency (1995)²⁰, and Rod Snow’s investigation of the visual profiles of at risk youth in Akron, Ohio (1981)²³. Research has also been done on the link between convergence insufficiency and behavior. In 1999, Eric Borsting used the Connor’s Rating Scale for Parents to establish a link between behavior and visual dysfunction.¹⁶ In 2000, Ellickson found that deviant behavior in grade seven, poor grades, and weak bonds with middle school predicted violent behavior five years later.³⁴

However, our research had a different objective. We set out to find if a well utilized and highly respective behavioral assessment battery would show some

association with children with visual problems. Relative risk factors were evident with refractive disorders, binocular dysfunction, motility (DEM), and visual motor perception. These associations, however, did not yield statistically significant correlations between certain problematic behaviors and visual difficulties. Rather than coming to a conclusion, this research has led to more unanswered questions. It is obvious that a link between vision and delinquency exists. Would a larger sample size show the statistical significance needed? How does the visual profile of a successful student compare to that of the struggling student? At what level of visual deficits should one intervene? Would visual training intervention be enough to guarantee success?

Further research in this area is essential. John Wilson, Administrator of the Juvenile Justice Department, says that education may be the single most important rehabilitative service the justice system may offer to the juvenile delinquent to prepare them for success. Although school success may not stop delinquency, without it, the juvenile may have a much harder time.³⁵ Ellickson advises violence prevention programs for younger adolescents to include efforts to prevent or reduce poor academic performance.³⁴ In order to succeed in school, these juveniles need to be equipped to learn, which means having an efficient visual system, since 70% of learning is through vision. A standardized, easily utilized approach for identifying children with undiagnosed visual disorders in the classroom must be found to help educators do their jobs successfully—and to protect the interests of the children involved, as well as the greater public.

Once a method of easily identifying at-risk juveniles are found, intervention must occur. From a social standpoint, a question that must be answered is even if intervention reduces one of more social ill, does the costs of the intervention program exceed the benefits. Cohen (1998) estimates that the potential monetary benefits from “saving” one high-risk youth is \$1.7 to \$2.3 million (estimated from the lifetime costs associated with the typical career criminal).³⁶ If reducing social ills is not enough incentive to identify students and intervene, this monetary figure should leave something to think about.

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